Reply to Notice of Allowance Dated 3/10/2006   Appl. No.:09/910,937
Amendment Dated: April 17, 2006   Attorney Docket No.: CSCO-005/2899

Listing of Claims

1 (Currently Amended): A method of supporting network address translation (NAT) in a service selection gateway (SSG), said SSG connecting a plurality of remote systems on a network to a plurality of service domains, each of said plurality of remote systems being assigned a corresponding one of a plurality of original addresses, wherein each of a said plurality of new addresses is used for a corresponding one of said plurality of remote systems in a corresponding service domain, each of said plurality of original addresses comprising a local address in said network and each of said plurality of new addresses comprising an external address for the remote system in the service domain, said method being performed in said SSG, said method comprising:

maintaining a plurality of NAT tables, wherein each of said plurality of NAT tables maintains a corresponding plurality of entries representing a mapping information of original addresses to corresponding new addresses, wherein said plurality of entries are partitioned according to service domains such that entries corresponding to each service domain are stored in a single one of said plurality of NAT tables, wherein an entry corresponds to a service domain if the corresponding new address is in the service domain;

receiving a packet containing an original a first address;

translating said first address into a new second address by examining one of said plurality of NAT tables, wherein said first address corresponds to one of said plurality of original addresses or one of said plurality of new addresses of a first remote system, and wherein said second address comprises the other one of said plurality of original addresses or one of said plurality of new addresses of said first remote system;

substituting said new second address for said original first address in said packet to generate a new packet; and

sending said new packet to one of said plurality of remote systems or one of said service domains determined by a destination address in said new packet.

2 (Canceled)

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3 (Previously Presented): The method of claim 1, wherein each of said plurality of NAT tables stores NAT information corresponding to one of said plurality of service domains only.

4 (Previously Presented): The method of claim 1, wherein at least one of said plurality of NAT tables stores all mapping information related to at least two of said plurality of service domains, wherein external addresses provided for mapping by said at least two of said plurality of service domains do not overlap.

5 (Currently Amended): The method of claim 1, wherein said translating comprises mapping said local address of said first remote system to said external address of said first remote system, wherein said external address is assigned to said first remote system by said service domain accessed by said first remote system.

6 (Original): The method of claim 5, further comprising:
determining a service domain to which said packet relates to, wherein said service domain is comprised in said plurality of service domains; and
sending said packet to an upstream NAT block which performs said substitution.

7 (Currently Amended): The method of claim 6, wherein said first remote system communicates with said SSG on a point-to-point protocol (PPP) session, said method further comprising:
assigning said local address to said first remote system when said PPP session is set up;
storing in said SSG data representing a set of services available for packets received from said first remote system, wherein said determining comprises examining a destination address in said packet to identify said service domain to which said packet relates to.

8 (Original): The method of claim 7, wherein a separate upstream NAT block associated with each of said plurality of NAT tables.

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9 (Original): The method of claim 8, further comprising maintaining a separate forwarding table associated with the service domains sharing the same NAT table.

10 (Currently Amended): The method of claim 1, wherein said packet is received from said service domain and destined to said first remote system, and wherein said ~~original~~ first address comprises said external address of said first remote system.

11 (Original): The method of claim 10, further comprising:

maintaining a global forwarding table; and

determining a route to send said packet by examining said global forwarding table, wherein said determining is performed after said substituting.

12 (Previously Presented): The method of claim 1, wherein said packet is received according to Internet Protocol (IP).

13 (Currently Amended): A service selection gateway (SSG) supporting network address translation (NAT), said SSG connecting a plurality of remote systems on a network to a plurality of service domains, each of said plurality of remote systems being assigned a corresponding one of a plurality of original addresses, wherein each of a ~~said~~ plurality of new addresses is used for a corresponding one of said plurality of remote systems in a corresponding service domain, each of said plurality of original addresses comprising a local address in said network and each of said plurality of new addresses comprising an external address for the remote system in the service domain, said SSG comprising:

means for maintaining a plurality of NAT tables, wherein each of said plurality of NAT tables maintains a corresponding plurality of entries representing a mapping information of original addresses to corresponding new addresses, wherein said plurality of entries are partitioned according to service domains such that entries corresponding to each service domain are stored in a single one of said plurality of NAT tables, wherein an entry corresponds to a service domain if the corresponding new address is in the service domain;

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means for receiving a packet containing ~~an original~~ a first address;

means for translating said first address into a ~~new~~ second address by examining one of said plurality of NAT tables, wherein said first address corresponds to one of said plurality of original addresses or one of said plurality of new addresses of a first remote system, and wherein said second address comprises the other one of said plurality of original addresses or one of said plurality of new addresses of said first remote system;

means for substituting said ~~new~~ second address for said ~~original~~ first address in said packet to generate a new packet; and

means for sending said new packet to one of said plurality of remote systems or one of said service domains determined by a destination address in said new packet.

14 (Canceled)

15 (Previously Presented): The SSG of claim 13, wherein said means for storing stores NAT information corresponding to one of said plurality of service domains only in each of said plurality of NAT tables.

16 (Previously Presented): The SSG of claim 13, wherein at least one of said plurality of NAT tables stores NAT information related to at least two of said plurality of service domains, wherein said at least two of said plurality of service domains have non-overlapping address space accessible by said remote systems.

17 (Currently Amended): The SSG of claim 13, wherein said ~~original~~ first address comprises said local address of said first remote system, and said means for translating ~~comprisesmapping~~ maps said local address to said external address of said first remote system, wherein said external address is assigned to said first remote system by said service domain accessed by said first remote system.

18 (Currently Amended): The SSG of claim 17, wherein said packet is received from said first remote system ~~and said original address comprises said local address~~, said gateway

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device further comprising:

means for determining a service domain to which said packet relates to, wherein said service domain is comprised in said plurality of service domains; and

means for sending said packet to an upstream NAT block which performs said substitution.

19 (Currently Amended): The SSG of claim 18, wherein said <u>first</u> remote system communicates with said SSG on a point-to-point protocol (PPP) session, said gateway device further comprising:

means for assigning said local address to said <u>first</u> remote system when said PPP session is set up; and

means for storing data representing a set of services available for packets received from said <u>first</u> remote system, wherein said means for determining examines a destination address in said packet to identify said service domain to which said packet relates to.

20 (Currently Amended): A computer readable storage medium carrying one or more sequences of instructions for causing a service selection gateway (SSG) to support network address translation (NAT), said SSG connecting a plurality of remote systems on a network to a plurality of service domains, each of said plurality of remote systems being assigned a corresponding one of a plurality of original addresses, wherein each of <u>a</u> ~~said~~ plurality of new addresses is used for <u>a corresponding</u> one of said plurality of remote systems in a corresponding service domain, each of said plurality of original addresses comprising a local address in said network and each of said plurality of new addresses comprising an external address for the remote system in the service domain, said method being performed in said SSG, wherein execution of said one or more sequences of instructions by one or more processors contained in said gateway device causes said one or more processors to perform the actions of:

maintaining a plurality of NAT tables in said SSG, wherein each of said plurality of NAT tables maintains a corresponding plurality of entries representing a mapping information of original addresses to corresponding new addresses, wherein said plurality of

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entries are partitioned according to service domains such that entries corresponding to each service domain are stored in a single one of said plurality of NAT tables, wherein an entry corresponds to a service domain if the corresponding new address is in the service domain;

receiving a packet containing an original a first address;

translating said first address into a new second address by examining one of said plurality of NAT tables, wherein said first address corresponds to one of said plurality of original addresses or one of said plurality of new addresses of a first remote system, and wherein said second address comprises the other one of said plurality of original addresses or one of said plurality of new addresses of said first remote system;

substituting said new second address for said original first address in said packet to generate a new packet; and

sending said new packet to one of said plurality of remote systems or one of said service domains determined by a destination address in said new packet.

21 (Canceled)

22 (Previously Presented): The computer readable storage medium of claim 20, wherein each of said plurality of NAT tables stores a NAT information corresponding to one of said plurality of service domains.

23 (Previously Presented): The computer readable storage medium of claim 20, wherein at least one of said plurality of NAT tables stores NAT information related to at least two of said plurality of service domains, wherein said at least two of said plurality of service domains have non-overlapping address space accessible by said remote systems.

24 (Currently Amended): The computer readable storage medium of claim 20, wherein said original first address comprises said local address of said first remote system, and said translating comprises mapping said local address to said external address of said first remote system, wherein said external address is assigned to said first remote system by said service domain accessed by said first remote system.

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25 (Previously Presented): The computer readable storage medium of claim 24, further comprising:

determining a service domain to which said packet relates to, wherein said service domain is comprised in said plurality of service domains; and

sending said packet to an upstream NAT block which performs said substitution.

26 (Currently Amended): The computer readable storage medium of claim 25, wherein said first remote system communicates with said SSG on a point-to-point protocol (PPP) session, further comprising:

assigning said local address to said first remote system when said PPP session is set up;

storing in said SSG data representing a set of services available for packets received from said first remote system, wherein said determining comprises examining a destination address in said packet to identify said service domain to which said packet relates to.

27 (Previously Presented): The computer readable storage medium of claim 26, wherein a separate upstream NAT block is associated with each of said plurality of NAT tables.

28 (Previously Presented): The computer readable storage medium of claim 27, further comprising maintaining a separate forwarding table associated with the service domains sharing the same NAT table.

29 (Currently Amended): The computer readable storage medium of claim 20 24, wherein said packet is received from said service domain and destined to said first remote system, and wherein said original first address comprises said external address of said first remote system.

30 (Previously Presented): The computer readable storage medium of claim 29, further comprising:

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maintaining a global forwarding table; and

determining a route to send said packet by examining said global forwarding table, wherein said determining is performed after said substitution.

31 (Previously Presented): The computer readable storage medium of claim 24, wherein said packet is received according to Internet Protocol (IP).

32 (Currently Amended): A service selection gateway (SSG) supporting network address translation (NAT), said SSG connecting a plurality of remote systems on a network to a plurality of service domains, each of said plurality of remote systems being assigned a corresponding one of a plurality of original addresses, wherein each of a ~~said~~ plurality of new addresses is used for a corresponding one of said plurality of remote systems in a corresponding service domain, each of said plurality of original addresses comprising a local address in said network and each of said plurality of new addresses comprising an external address for the remote system in the service domain, said SSG comprising:

a memory storing a plurality of NAT tables representing information related to network address translation, wherein each of said plurality of NAT tables maintains a corresponding plurality of entries representing a mapping information of original addresses to corresponding new addresses, wherein said plurality of entries are partitioned according to service domains such that entries corresponding to each service domain are stored in a single one of said plurality of NAT tables, wherein an entry corresponds to a service domain if the corresponding new address is in the service domain;

an inbound interface receiving a packet containing ~~an original~~ a first address;

a NAT block translating said first address into a ~~new~~ said address using one of said plurality of NAT tables and substituting said ~~new~~ second address for said ~~original~~ first address in said packet to generate a new packet, wherein said first address corresponds to one of said plurality of original addresses or one of said plurality of new addresses of a first remote system, and wherein said second address comprises the other one of said plurality of original addresses or one of said plurality of new addresses of said first remote system; and

an outbound interface sending said new packet to one of said plurality of remote

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systems or one of said service domains determined by a destination address in said new packet.

33 (Canceled)

34 (Previously Presented): The gateway device of claim 32, wherein each of said plurality of NAT tables stores a NAT information corresponding to one of said plurality of service domains.

35 (Previously Presented): The SSG of claim 32, wherein at least one of said plurality of NAT tables stores NAT information related to at least two of said plurality of service domains, wherein said at least two of said plurality of service domains have non-overlapping address space accessible by said remote systems.

36 (Currently Amended): The SSG of claim 32, wherein said ~~original~~ first address comprises said local address of said first remote system, and said translating comprises mapping said local address to said external address of said first remote system, wherein said external address is assigned to said first remote system by said service domain accessed by said first remote system.

37 (Currently Amended): The SSG of claim 36, wherein said packet is received from said first remote system and said ~~original~~ first address comprises a source address of said first remote system.

38 (Previously Presented): The SSG of claim 37, further comprising:
a service selection table storing data indicating a mapping of each packet to a corresponding one of said plurality of service domain; and
a service selector determining a service domain to which said packet relates to by examining said service selection table, wherein said service domain is comprised in said plurality of service domains and sending said packet to said NAT block.

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39 (Previously Presented): The SSG of claim 38, wherein a separate upstream NAT block associated with each of said plurality of NAT tables.

40 (Previously Presented): The SSG of claim 39, further comprising a separate forwarding table associated with the service domains sharing the same NAT table.

41 (Currently Amended): The SSG of claim 36, wherein said packet is received from said service domain and destined to said first remote system, and wherein said ~~original~~ first address comprises said external address of said first remote system.

42 (Previously Presented): The SSG of claim 41, further comprising:

a global forwarding table; and

a forwarding block determining a route to send said packet by examining said global forwarding table, wherein said forwarding block determines said route after said substituting.

43 (Previously Presented): The SSG of claim 36, wherein said packet is received according to Internet Protocol (IP).

44 (Previously Presented): The SSG of claim 32, wherein said memory is implemented as a plurality of units.

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